

SINCLAIR. (A. G.)

ELECTRO-MAGNETISM

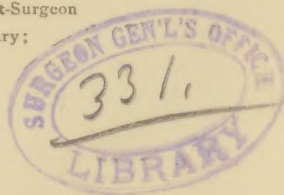
IN OPHTHALMIC SURGERY.

WITH ILLUSTRATIVE CASES.

Read before the Tri-State Medical Association of Mississippi,
Arkansas and Tennessee,

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Electro-Magnetism in Ophthalmic Surgery,

WITH ILLUSTRATIVE CASES.

As the cases in which the magnet may be employed with advantage as frequently fall into the hands of the general practitioner as into those of the specialist, and as, moreover, its early employment contributes greatly to success in its use, it occurred to me that a brief article on this subject would interest the Society.

Although it is long since the magnet was first employed in surgery; for example, by Fabricius Hildanus in the seventeenth century, by Milles and others in the eighteenth, and by still others later on, its use was very limited and of the crudest fashion until 1873. In that year Dr. McKeown of Belfast employed it successfully in a series of cases, in which fragments of steel or iron had been driven into the eyeball. These he published in 1874, and from that time the magnet has been considered one of the most valuable agents at the command of the ophthalmologist.

Two forms of the instrument are in use—the simple (bar) magnet, and the electro-magnet. The former was that employed by Dr. McKeown; the latter is, however, much more powerful, and is therefore preferred by the majority of operators, as it admits of the use of extremities more slender, and hence better adapted for introduction within the eyeball. Moreover it is sometimes an advantage to render the extremity magnetic only at, or immediately before, the moment of contact with the foreign body, and this the electro-magnet enables the operator to do. The polar extensions being detachable, a broader surface and more powerful tractive force can be employed at will, or an extension adapted to the case

in hand substituted. Hirshberg of Berlin was probably the first to employ this form of the instrument in ophthalmic surgery.

Although the magnet may be an aid in the removal of fragments of steel or iron from the superficial structures of the eye, it is in the extraction of those which have passed into the interior of the organ that its great advantages are most strikingly displayed. In the cornea these foreign bodies are generally too firmly embedded to yield to the power of the magnet, and are more easily acted upon with the scoop, spud, and other instruments. A similar difficulty is experienced when the object is lodged in the firmer structures of the interior, as the iris, ciliary body, choroid, optic papilla, retina, or even the crystalline lens, but even from most of these tissues the removal of fragments has often been effected, and where the resistance to be overcome is mainly that offered by the vitreous, which is easily broken up, or the aqueous humor, the action of the magnet is available, and renders the extraction of visible particles almost a certainty, while that of even those that cannot be seen can generally be effected by a skillful operator. The advantage of searching in the interior of an eyeball for an object with an instrument that will attract and adhere to it, over the same process with one possessing no such property, as operators were compelled to do several years ago, is very apparent, and many eyes are now saved which in those days would have been condemned to enucleation.

In regard to the manner of using the electro-magnet, I would premise by saying that the instrument, as applicable to the eye, is by no means one of great power, and it is therefore necessary to make a passage for it up to, or very nearly to, the object to be attacked; even the coating of lymph, which soon covers a foreign body in the vitreous humor,

will materially interfere with the influence of the magnet. Nor is the latter always sufficiently powerful to prevent the lips of a very limited wound from brushing the adherent intruder from the magnet during its withdrawal. It is therefore well, unless the original wound is recent and ample to obviate this danger, to make a new passage by incising the cornea or sclerotica, as the case may be, selecting for this purpose of course the point from which the extraneous substance can be most easily reached. Except in the case of very small bodies it is often an advantage to make the incision T shaped, as in this form it affords more ready exit and lessens the liability to detachment of the object from the magnet during withdrawal. The scleral wound should be closed with sutures, otherwise before making it a flap of conjunctiva should be dissected up in such a manner as to form a cover for the scleral incision, in which case sutures in the conjunctiva will be sufficient.

The magnet may also be used as an aid to diagnosis in doubtful cases, as when a particle within the eye is seen but its nature is uncertain, or in the case of a similarly situated mass of lymph which may contain a piece of iron or steel. When a powerful magnet is placed near the eye such objects will be seen to move toward it. It may also be employed in the case of invisible fragments of iron in the eyeball. A suspended magnet placed near an eyeball which contains a piece of iron or steel will move toward the point at which the latter is situated under the same influence of course which attracts the iron to it. In this way the presence of steel or iron has been repeatedly detected. This was shown by Dr. Pooley of New York who, acting upon this principle of mutual attraction, made a series of experiments upon enucleated eyes, and eyes of the lower animals, into which portions of steel had been thrust, and using as his magnet a magnetized

sewing needle suspended by a silk thread. Pooley increased the power of his magnet by rendering the fragment in the eye also magnetic; and this may also be done with advantage in the human eye, by passing a galvanic current through the organ, or by induction. The value of the magnet as an aid to diagnosis is not new to general surgery, the magnetic needle having been employed for the detection of fragments of steel or iron in tissues by Brodie and others.

The following cases will serve to show in some measure what the electro-magnet can or cannot accomplish in the extraction of foreign bodies from the eye:

W. J., engineer, was brought to me in March last with an injury of the eye, caused by a fragment of metal which flew from a piece of iron or from the hammer with which he had struck it. Near the center of the cornea was a wound which evidently extended entirely through this membrane, as the anterior chamber was much reduced in depth, the iris lying almost in contact with the cornea. Externally, at the seat of injury, nothing was visible but corneal tissue, but internally, opposite the point of injury, there was seen through the uninjured portion of the cornea a minute black body projecting into the anterior chamber, which was evidently the interesting object of my search. It was so deeply embedded that it was apparent at a glance that its removal through the original wound would be very difficult if not impossible, and I determined to attack it from the inner surface, and to employ the electro-magnet. I was assisted in the operation by Dr. Overall of this city. The thorough application of cocaine utterly failed to produce anæsthesia, the only instance in which this has occurred in my practice, although I have used it many times in nearly all operations on the eye since its introduction, having been the first operator in the South to employ the drug. Chloroform was sub-

stituted, and a curved incision was made in the cornea near its periphery. Through this the electro-magnet was passed and onward to the site of the injury, and no doubt into contact with the metal, although the latter was then hidden from view by a coating of lymph. Its withdrawal failed, however, to bring away the foreign body. The attempt twice repeated yielded no better result. I then laid the magnet aside, and taking up a delicate pair of iris forceps passed it with closed blades to the point at which I believed the foreign body to be situated, and at the first attempt succeeded in seizing it and bringing it away in the bite of the forceps. Although the magnet had failed to dislodge the foreign body, it was with keen satisfaction that I saw the latter after removal spring to the magnet, thus proving its nature, and hence, that the little particle was the object I had sought. Rapid recovery followed with vision equal to reading print less than half the size of ordinary book type. This case illustrates and sustains what has been said regarding the inability of the magnet to extract fragments which are at all firmly embedded in the denser tissues of the eyeball.

J. G. C., foreman in a machine shop, was sent me from Mississippi in August last. On the day preceding his arrival he was struck on the eye by a fragment from a steel hammer. He had had no pain, the eye was but little irritated, and vision but slightly dimmed. On examination I detected a small fragment of steel in the iris close to its pupillary margin, where it had lodged after passing through the cornea and across the anterior chamber. The corneal wound had healed so perfectly that to the unaided eye it was quite invisible. I was assisted by Prof. Sim and Dr. Neely of this city. The eye was cocainized, after which I made an incision in the cornea similar to that employed in the preceding case, passed the electro-magnet into the anterior chamber and

onward toward the foreign body. When within half a millimetre of the latter it was seen to leave its bed in the iris and leap to the magnet, to which it adhered firmly, and was extracted without difficulty. To prevent if possible the dilatation of the pupil by the cocaine, or on the escape of the aqueous humor, I had instilled eserine before the operation. It acted well, and on completion of the operation the eye presented a perfectly normal appearance, aside from the temporarily diminished depth of the anterior chamber, and slight conjunctival congestion. The value of the electro-magnet is here very strikingly shown, as before its employment in ophthalmic surgery a foreign body situated where this one was could not have been removed without at the same time excising the segment of iris in which it was embedded. Indeed, on its firm entanglement in the iris would its removal and consequent rescue of the eye in a great measure depend. For if but slightly attached, manipulation with the forceps would almost certainly cause its displacement and disappearance into the depths of the eye from which the removal of so small an object could not be effected. Without the magnet the best that could be hoped for would be recovery, with a distorted pupil and more or less impaired sight. In this case, on the other hand, when discharged six days after the operation, the pupil was round and active, sight was perfect, in short the eye was in all respects absolutely normal.

Other similar cases might be added from my clinical records, but the foregoing will suffice for the purposes of this paper.

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